

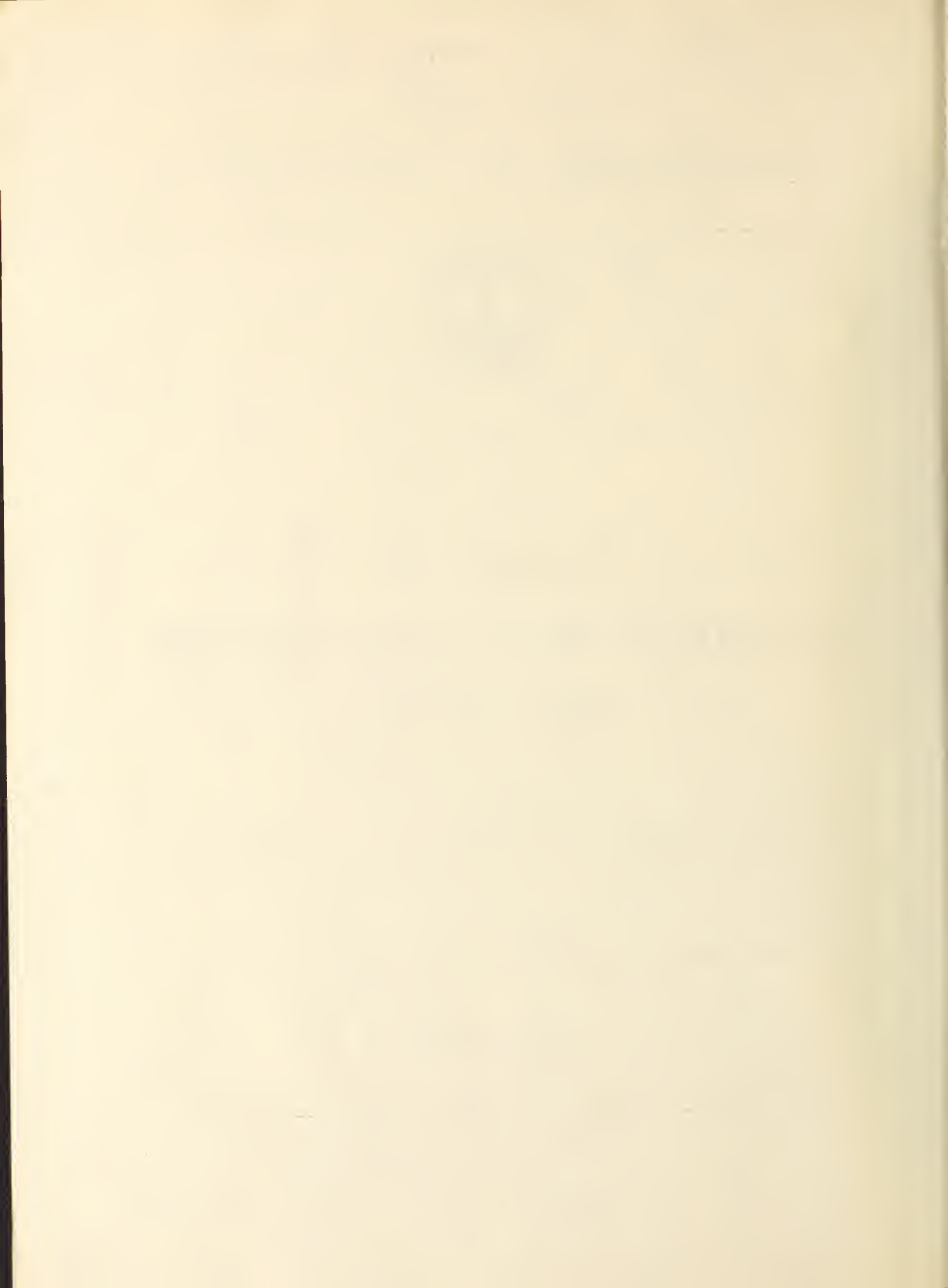
UNITED STATES
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BUREAU OF
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ADMINISTRATION

Grace A. Sandhouse

Grace Adelbert Sandhouse, associate entomologist in the Division of Identification and Classification of Insects, died at St. Luke's Hospital, Denver, Colo., on November 9. The courage with which she "carried on," despite the knowledge during several years that the end could not be far distant, was characteristic of her attitude toward her work. It was during this period that she produced some of her finest contributions to science.

Miss Sandhouse was born on June 1, 1896, at Monticello, Iowa. She was graduated from the University of Colorado in 1920. From 1922 to 1924 she held a fellowship in entomology at the same institution, receiving the degree of Master of Arts in 1923. In 1924-25 she was a teaching fellow at Cornell University. During this period she completed the residential requirements for the degree of Doctor of Philosophy.

In 1925 Miss Sandhouse entered the Federal service as a senior scientific aide in the Federal Horticultural Board. In 1926 she was transferred to the Bureau of Entomology as junior entomologist in the Division of Insect Identification, specializing on the identification and classification of the bees. Subsequently she took over the identification of the other groups of the Aculeata and latterly of the sawflies.

As a taxonomist Miss Sandhouse takes high rank. An indefatigable worker with a fine perception for the significance of taxonomic characters, she acquired an international reputation. While still a university student Miss Sandhouse produced several contributions to the knowledge of the bees. Even at this early date, one feature that was to characterize her subsequent work was evidenced, for in these papers, even though she was describing only a single species, she almost invariably presented a key to at least a species group. Among the more important of her writings are revisions of the North American species of the subgenus Halictus (Chloralictus) (1924); the species of Agapostemon of the United States (1936); the species of Augochlora, Augochloropsis, and Augochlorella of the United States (1937); the Nearctic wasps of the genus Trypoxylon (1940); the North American species of Osmia (1939); the last of which was accorded the honor of being published

as Memoir No. 1 of the Entomological Society of Washington. A completed but as yet unpublished work is a catalogue of the genotypes of the genera of the bees of the world.

Miss Sandhouse was a member of the American Association for the Advancement of Science, the Entomological Society of America, and the Entomological Society of Washington. She is survived by her mother, with whom she had made her home for a number of years, and by two brothers.

FRUIT INSECT INVESTIGATIONS

Further studies on the biology of the plum curculio.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, found that during 1940 approximately 60 percent of the first-generation beetles in the insectary laid second-generation eggs. This was a little less than the proportion depositing eggs in 1937 and 1938, but a little more than the proportion for 1936 and 1939. Second-generation eggs began to form in the bodies of new females on July 5, but it was July 26 before any eggs matured. The peach harvest was completed on July 25. This is the first year since 1923 that the Georgia peach crop was not subjected to attack by at least a partial second brood of the plum curculio. Sixty-one percent of the new beetles deposited second-generation eggs by the end of peach harvest in 1937, 37 percent by the end of peach harvest in 1938, and 46 percent by the end of peach harvest in 1939. Other studies revealed the fact that plum curculio females of the first generation enter hibernation before depositing all of their second-generation eggs. Forty-five percent in the laboratory entered hibernation this year before depositing all of their eggs. Of 39 females of the first generation that had not oviposited during the season, only 1 had developed eggs within her body.

Raisin moth in waste mulberries.--Samples of fallen mulberries were taken from beneath a single tree during the summer by Dwight F. Barnes and George H. Kaloustian, of the Fresno, Calif., laboratory. It was found that infestation was present in samples taken at intervals of about 1 week from May 14 to August 2, indicating that mulberries serve as a source of adults as late as July and August. An average of about 20 percent of the larvae had been parasitized by Microbracon (probably hebetor (Say)) and about 2 percent by Idechthis canescens (Grav.). The calculated populations of raisin moth stages in the waste mulberries under the tree on the dates of collection were as follows:

Date	Individuals found	
	Per square foot	Under tree
	Number	Number
May 14-----	21.00	59,367
24-----	209.00	590,843
31-----	136.00	384,472
June 7-----	54.75	154,728
14-----	72.00	203,544
21-----	50.50	142,763
28-----	48.00	135,696
July 5-----	61.00	172,447
12-----	44.50	125,801
18-----	23.00	65,021
26-----	6.00	16,962
August 2-----	1.50	4,240

MEXICAN FRUITFLY CONTROL

No fruitfly larvae found in October.--Harvesting of citrus fruit for the 1940-41 season started in the lower Rio Grande Valley on October 1. Fruit from only a few groves passed the maturity test during the first few days of the month, but by the close of the month 3,366.5 equivalent carloads of fruit had been harvested and shipped. This is the largest shipment of fruit during any October in the history of the Texas citrus industry. Grove inspections in every district failed to disclose any larval infestations and the operation of approximately 9,000 traps throughout the area resulted in the taking of only 1 Mexican fruitfly.

JAPANESE BEETLE CONTROL

Large-scale soil treatments.--Nearly 450 acres of ground at isolated Japanese beetle infestations, which are being treated to control that insect and avoid the imposition of Federal quarantine, received applications of lead arsenate at the rate of 500 pounds per acre during October. The work accomplished was as follows:

State	:	City	:	Area treated
	:		:	Acres
Illinois-----	:	Chicago	:	55.30
	:		:	
Indiana-----	:	Elkhart	:	11.10
	:	Indianapolis	:	20.80
	:	South Bend	:	19.30
	:		:	
Michigan-----	:	Detroit	:	61.70
	:	Melvindale	:	1.50
	:		:	
New York-----	:	Dansville	:	1.25
	:	Newark	:	48.60
	:		:	
North Carolina-	:	Burlington	:	18.90
	:	Charlotte	:	11.90
	:	Durham	:	5.90
	:	Greensboro	:	23.00
	:	Lexington	:	4.80
	:	Rocky Mount	:	1.30
	:	Salisbury	:	3.40
	:	Spencer	:	18.00
	:	Winston-Salem	:	37.10
	:		:	
Ohio-----	:	Ashtabula	:	27.00
	:	Conneaut	:	36.00
	:	Marietta	:	4.50
	:	Zanesville	:	16.60
	:		:	
Virginia-----	:	Danville	:	13.50

Fall nursery-shipping season progresses.--Although the weather was too mild during the month for the shipment of much nursery stock from some of the southern districts in Maryland and Virginia, there was a definite increase in the inspection of nursery stock from Delaware north. In Delaware 390,882 pieces of nursery stock were certified during the month. As the fall shipping season got under way in the New York districts, the volume of business appeared to be in excess of last year. Two concerns in northern New York used a great many more certificates for parcel post and express shipments than they did last fall. Following a normal trend of big increases over September, October plant shipments from the Philadelphia area reached their highest volume for several years. A permanent inspector was assigned to the West Grove, Pa., section on October 21. Chemical treatments of nursery stock in general increased as the shipping season progressed. Plants fumigated with methyl bromide totaled 322,743 this month, as compared with 136,166 in September. A supply of miscible carbon disulfide and galvanized collars was taken to a Maryland nursery for demonstration. Conditions at this nursery proved satisfactory for carbon disulfide field treatments and the nurseryman will use this treatment to supplement the methyl bromide fumigations and paradichlorobenzene treatments already in use.

Maryland certification activities.--On October 30, inspectors from the Baltimore office fumigated 4,574 hydrangeas that had been packed for shipment. This was done under the direction of H. C. Donohoe, of the Division of Control Investigations, and V. A. Johnson, of this Division's treating section, to determine the effectiveness of fumigating the plants in the shipping containers. Work is under way to determine a satisfactory method of killing grubs in potted hydrangeas in the field. Japanese beetle grubs have been feeding on the hydrangea roots, resulting in considerable loss of plants. Hydrangeas fumigated in Maryland during September totaled 4,871, with an increase to 78,057 in October. Shipments of nursery stock increased considerably in October. During the operation of the quarantine on cut flowers, 48 adult beetles were removed from 3,208 shipments inspected. This compares with 30 beetles removed from 3,968 packages examined in 1938. This year the first adult infestation in cut flowers was found on June 20 and the last on October 6. Twenty camellias of 13 varieties were treated with paradichlorobenzene for 1 grower who wished to determine how these plants would withstand this type of treatment. Certification was also granted for 661 square feet of grub-free grass stolons shipped from the District of Columbia.

New building to facilitate quarantine compliance.--At a large nursery establishment in Princess Anne, Md., a new building has been erected to house the washing, grading, and packing of stock from infested fields. The erection of this building will enable the nursery to wash, grade, and pack stock during the approaching winter season. Previously it had been impracticable to wash the stock during freezing weather, owing to injury to the roots which resulted in later death of the plants. Evidence of improved conditions in the nursery industry is frequently noted in the way of new buildings, leasing of extra ground, and the renovation of old equipment that has been allowed to deteriorate.

Adult beetles removed from inspected articles.--Inspectors in the Philadelphia district found 805 Japanese beetles on cut flowers inspected between June 15 and October 15, and 129 beetles on produce examined during

the operation of the fruits and vegetables quarantine from June 15 to September 19. The small number of beetles found on cut flowers inspected was due to instructions from the wholesale cut flower dealers to the growers that they did not want beetle-infested blooms. Temporary inspectors engaged in cut-flower work in the various districts were dismissed at the termination for the year of the quarantine on this commodity on June 15. A few adults were found in Philadelphia up until October 19, when freezing weather terminated their activities.

Grubs collected for experimental purposes.--A crew of men was employed by the treating section of the Division to dig for Japanese beetle grubs. The diggings were made at the Mapledale Country Club, about a mile west of Dover, Del., where there is a heavy grub population. Approximately 75,000 grubs were dug for use at the Moorestown, N. J., laboratory on paradichlorobenzene tests. Grubs were also dug for methyl bromide experiments by the Division of Control Investigations at the White Horse, N. J., laboratory.

Stock to be treated for World's Fair exhibitors.--Several inquiries were received from exhibitors at the New York World's Fair concerning treatment of plant stock to be moved from the grounds after the close of the fair on October 27. Arrangements were made for treatment of the stock with carbon disulfide in November.

Corn borer infestations.--Two new infestations of the European corn borer, both in corn, were reported by the Norfolk, Va., suboffice during the month, one in the lower part of Princess Anne County and the other in Norfolk County. Several trips on the Eastern Shore of Virginia were made to make corn borer inspections and to issue certificates. Last year one of the flower shippers in that area had several shipments confiscated, owing to lack of corn borer certification. This year shippers are requesting certificates to cover all their shipments.

Moth infestations in inspected products.--Sixty-eight shipments of lumber, logs, railroad ties, marble, native trees, nursery stock, mixed greens, and Christmas trees inspected during October yielded 604 gypsy moth egg clusters. In addition, 708 egg masses were found in birchwood and birch bark inspected prior to manufacture into novelties for sale all over the country. Among the heavily infested products inspected was a carload of birch logs being shipped from Conway, N. H., to Philadelphia, Pa. From these logs 88 egg clusters were removed. A carload of lumber inspected at Meredith, N. H., for shipment to Rochester, N. Y., was found to contain 47 egg clusters. Another carload of lumber inspected at Biddeford, Maine, for movement to St. John, New Brunswick, Canada, yielded 36 egg masses.

Temporary inspectors added to gypsy moth force.--Twenty-three temporary inspectors were employed during October to assist in gypsy moth quarantine inspection activities.

Christmas-tree infestation.--On October 25 a gypsy moth egg cluster was found on a spruce Christmas tree presented for inspection at Reading, Vt. This tree was one of a truckload of trees destined to Orleans, Vt.; a point outside the gypsy moth infested area, for later reshipment to the

Middle West. This is the first gypsy moth egg cluster that was ever found in the lightly infested area of Vermont on a native spruce Christmas tree presented for inspection. From the infestation found in this tree it would appear that moth infestation is increasing in this lightly infested section.

Record-breaking lumber shipments.--Approximately 10,750,000 board feet of lumber was certified for shipment in October to points outside the gypsy moth regulated areas. This is the largest quantity of lumber ever certified under the gypsy moth quarantine regulations in any one month.

Elm owner fined for interfering with disease eradication work.--The following news story appeared during October in a New Jersey paper: "The owner of a Rumson, N. J., estate was ordered by District Court Judge Joseph Mattice to pay a \$100 penalty judgment for his refusal to permit the State Department of Agriculture to remove from his premises an elm tree which experts said was affected with Dutch elm disease. * * * He was charged in a complaint filed by the Attorney General's office with interfering with representatives of the Department of Agriculture in the performance of their duty. * * * According to testimony, the State Department, after an examination which showed the tree to be affected by the disease, sent a crew of men to the Rumson estate on September 17 to eradicate it. The owner refused to permit the men to carry out the work, witnesses testified, and they sought permission from the Rumson police department. Told by police they had authority to remove the tree, the State Department men returned to the premises and started to work, it was related. They left, however, when the owner appeared on the scene with a shotgun. 'Maybe I'm hunting rats,' he was quoted as saying. The judgment was entered by the court after he offered to permit the Department to remove the tree."

First-record Dutch elm disease infestations.--During October first-record cases were reported from Brookfield Township, Fairfield County, Conn., Chalfont Borough and Hilltown Township, Bucks County, and from Plymouth City, Luzerne County, Pa. In the detached infected areas, a diseased tree was discovered in Washington Township, Marion County, Ind., and three infected elms were located in Athens County, Ohio, two of which were in Alexander Township and the other in Dover Township. A first-record infection reported from the town of Preston, New London County, Conn., is the first diseased tree found in this county since discovery of a single infected tree in Old Lyme in 1937. The infected tree was approximately 30 miles northwest of the Old Lyme infection and 60 miles from New Haven. The diseased tree removed in the Preston area showed no signs of feeding by Scolytus multistriatus Marsh.; although a number of beetles of Hylurgopinus rufipes Eich. were hibernating in the bark on the trunk. Several entrance holes were found in one of the leaders with the channels started and deserted by the beetles. This condition was found in the leader that showed the most discoloration.

Few outer symptoms observed in infected tree.--A confirmed elm, removed in Deer Park Township, Orange County, N. Y., showed little change in its appearance since it was discovered. Discoloration had extended further down the trunk but had not reached the buttress of the tree and only a few of the smaller branches had died in the crown as a result of the disease. No evidence of bark beetle was observed. Woodpecker work is apparent in

some sections of the New York infected zone. One particular tree, north of Newburgh, was found riddled by these birds. This tree had a full crop of leaves last summer and was apparently normal until very recently when woodpecker work disclosed that the tree was heavily infested with S. multistriatus.

Girdled trees still problem in Ohio.--As was the case during last year's elm-sanitation work in the Athens, Ohio, area, crews are again confronted with large numbers of girdled trees. In fact, this practice has increased considerably over that of last year. From 1 property approximately 1,000 girdled elms have been removed. Another property owner is continuing to girdle trees ahead of our sanitation operations. The unwarranted girdling practices are developing to a point where effective sanitation work will be considerably hampered. They may even prevent completion of the sanitization of a safety area around the 1940 disease locations.

FOREST INSECT INVESTIGATIONS

Condition of hemlocks defoliated in 1934 by Ellopia athasaria.--J. V. Schaffner, Jr., of New Haven, Conn., reports as follows on the recovery of hemlock trees which were severely defoliated in 1934 by E. athasaria Walker: "A local outbreak occurred in Warwick, Mass., in 1934 where in September the trees on some 12 acres in a practically pure stand of hemlock were seriously defoliated. Sixty trees in this area were marked for observation concerning their recovery. These trees ranged from 4.8 to 12 inches D.B.H., averaging about 9 inches, and the estimated defoliation ranged from 70 to 100 percent. Their rating as to crown classification was as follows: 15 dominant, 16 co-dominant, 13 intermediate, and 16 suppressed. The site is considered very favorable for hemlock, and there has been no serious defoliation since 1934. The following table shows a classification of the estimated degree of defoliation for the 60 trees in the fall of 1934, the crown classification in 1934, and the condition as noted on October 24, 1940.

Defoliation in 1934	Trees	Trees in various crown classifications in 1934					Trees in various conditions on October 24, 1940					Trees up- rooted in 1938
		Dom.	C.D.	Int.	Sup.	Good	Fair	Poor	Dead	hurricane		
Percent	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	
70	1	0	0	0	1	1	0	0	0	0	0	
75	3	0	0	1	2	3	0	0	0	0	0	
80	6	2	1	1	2	4	0	0	0	0	2	
85	10	2	1	2	5	6	0	0	0	0	4	
90	13	3	5	2	3	11	0	0	0	0	2	
95	15	4	5	3	3	9	4	0	1	1	1	
95-100	12	4	4	4	0	1	1	1	9	0	0	
Total----	60	15	16	13	16	35	5	1	10	1/	9	

^{1/} These 9 trees were alive at the time they were uprooted in 1938, but since then 3 of them have died.

"It is believed that the above data are representative of the entire area affected. The results definitely indicate that thrifty hemlock trees will tolerate considerable defoliation late in the summer, when the current year's growth is nearly mature, and stand a good chance of recovering. However, if the degree of defoliation exceeds 95 percent a high mortality may occur. Local outbreaks occurred this year in New Haven County, Conn., in two natural stands of hemlock separated by a distance of about 10 miles. In each stand the hemlock trees on some 5 acres were seriously defoliated and the owners are much concerned about the possibility of the trees recovering. This prompted a check-up on the 1934 infestation at this time. The geometrid E. athasaria passes the winter in the pupal stage in the duff. The larvae are normally active from late in July to the latter part of September, but this year a few larvae were found in Connecticut as late as October 22."

Matsucoccus injury increases in Pennsylvania.--T. J. Parr, of the New Haven, Conn., laboratory, reports as follows on an examination of pines in Pennsylvania infested with Matsucoccus gallicolus Morrison: "The period October 16 to 19 was spent taking notes on the condition of pitch and shortleaf pines in the infested plots at Mont Alto and Mount Union, Pa. These plots, with the exception of one at Mount Union, appear in worse condition than they did last year. The exception is a natural stand, where there is some decrease, both in number of twigs and leaders killed this year. The following table gives a brief summary of twigs and leaders killed on these plots during the last 3 years:

Plot No.	Type of plot	Location	Current twigs killed			Current leaders killed			Plot trees dead			Total trees
			1938	1939	1940	1938	1939	1940	1938	1939	1940	
			No.	No.	No.	No.	No.	No.	%	%	%	
I--	Pitch-pine	Mont Alto	2,393	3,262	3,824	56	61	75	0.0	2.8	2.1	4.90
	plantation											
II--	Short-leaf											
	natural							1/				
	stand---	Mont Alto	216	316	564	20	22	17	8.26	7.6	12.8	26.03
III--	Pitch-pine	Mount										
	plantation	Union	173	169	401	0	0	2	.0	.0	.0	.00
IV--	Pitch-pine	Mount										
	plantation	Union	939	757	1,604	26	21	21	.0	2.8	.0	2.80
V--	Pitch-pine	Mount										
	natural	Union										
	stand--		1,237	1,295	1,000	27	24	16	.0	.0	.0	.00

1/

Many of the trees on this plot which had leaders killed last year died in 1940."

Beech scale infestation decreased in permanent plots in Maine.--L. D. Casey, of the New Haven, Conn., laboratory, reports as follows on an examination of permanent beech scale-Nectria plots in Maine, made in cooperation with J. R. Hensbrough, of the New Haven office of the Division of Forest Pathology of the Bureau of Plant Industry: "The beech scale-Nectria plots in Maine were examined during the first part of September. In nearly all of the plots the scale infestation was lighter than last year. In only 2 of the plots did the infestation show a slight increase. Nectria infection has increased in most cases and has spread to new trees. In the Liberty plots there was no mortality of beech which could be attributed to the scale or to Nectria. In some cases the decrease in scale infestation was due to dying bark on sections of the trees especially in the case of the larger trees. In Washington County there were 2 plots (Nos. 17 and 18) in which a few trees had died and several others were weakened. This was caused, it is believed, by scale infestation and Nectria infection. Apparently there will be a considerable mortality of beech in the vicinity of these 2 plots within a year or so. The plot at Orland still remains free from scale infestation and no beech scale was noted in the immediate vicinity. The plot at China, which had never been infested, was cut for cordwood this year. J. R. Hensbrough examined the plot at Hamilton, Mass., and reports the scale infestation slightly heavier than last year, with the Nectria condition remaining the same. During July 5 beech scale-Nectria study plots consisting of 50 trees each were established in Westchester County, N. Y. These plots were all lightly infested with scale but no Nectria infection was found."

Elm leaf beetle larvae perforate leaves when feeding.--In published articles concerning the elm leaf beetle (Galerucella xanthomalaena Schr.) it has often been stated that the larvae feed upon the lower surface of the leaves, eating the green tissue on this surface but leaving the veins and upper epidermis intact. Therefore, it has been recommended that in spraying with an arsenical for the control of the pest, particular attention should be given to applying the poison to the lower surface of the leaves. Last spring, C. L. Griswold, Morristown, N. J., noted that first-instar larvae in their customary habit of feeding on the under side of the leaves, often perforated the upper surface. Mr. Griswold carried on an experiment during the summer to ascertain to what extent the larvae perforated the leaves. Small elm trees growing in wooden tubs or metal pails were used. Some were placed in a shaded location in an insectary and the remainder were placed in the laboratory yard, fully exposed to the sun. A lead arsenate mixture was carefully applied to the upper surface of the leaves of two of the trees in the insectary and to the under side of the leaves of two other trees. Larvae were then put on the foliage of all trees. The leaves were perforated by larvae of all three instars, both on trees to which lead arsenate had been applied and on the untreated trees, except on one tree on which first-instar larvae had been placed after the poison had been put on the lower side of the leaves. In the case of the shaded trees this type of feeding exceeded the skeletonizing type in which the upper epidermis is not eaten. On the trees exposed to the sun the skeletonizing type of feeding predominated, especially on the leaves of the upper crown. The experiment suggests that in spraying to control the elm leaf beetle it is not as necessary to take extra pains to apply the insecticide to the under side of the leaves as has been previously supposed.

Adults of Scolytus sulcatus carry Dutch elm disease.--W. D. Buchanan, Morristown, N. J., reports that the Dutch elm disease fungus has been obtained from adults of S. sulcatus Fab. which were attracted to apple trap logs. Green apple logs were placed in several locations in northern New Jersey in the spring of 1940. At two locations adults of the scolytid later penetrated the bark of the logs and formed egg galleries. One hundred and fifty beetles taken from the logs at one location were cultured by the Morristown forest pathology laboratory of the Bureau of Plant Industry. The fungus was isolated from four of the beetles. Thirty five adults from logs in another area were similarly cultured with negative results. Apple is probably the usual host of S. sulcatus but it also breeds in elm. Mr. Buchanan has previously shown that this insect is capable of transmitting the Dutch elm disease fungus under controlled conditions. The experiment conducted by him in 1940 indicates that adults contaminated with the fungus occasionally occur in the field.

Mealybug on Engelmann spruce in Utah.--In 1939 the Forest Service reported an area of dying Engelmann spruce on the Fishlake National Forest near Loa, Utah, according to R. L. Furniss, of the Portland, Oreg., laboratory. The area was examined in November of that year and a mealybug, identified by Morrison as Puto sp., was found to be seriously infesting a considerable stand of spruce. On September 11 of this year the area was again visited and the mealybugs were found to be still active, but the infestation appeared to have abated considerably. Both young and old trees are infested. Although the trees have obviously been seriously weakened, none seem to have succumbed to the mealybug attacks. While the infested stand is of minor economic importance, the occurrence of this pest on spruce is of some significance, because of the possibility of its spread to more valuable species.

Black Hills beetle control on Powell National Forest.--During the season of 1939-40 approximately 17,000 infested ponderosa pine trees were treated by the Forest Service to control an outbreak of the Black Hills beetle on the Powell National Forest, Utah. In September the area was examined by Mr. Furniss, who reports that the control work was very thorough. A subsequent detailed survey showed that the current infestation is 92 percent less than that of last year. Plans have been made and control work is under way to treat several outlying areas that could not be reached last year before the beetles were in flight. When this work is completed, it is believed that the Black Hills beetle threat to the Powell Forest and the adjoining pine timber in Bryce Canyon National Park will be well under control.

Forest insects quiescent in Southwest.--Mr. Furniss also reports, as a result of a short inspection trip made in October through several National forests in Arizona and New Mexico, that primary insect enemies of pine forests in those States are causing very little damage at present. This is borne out by similar reports from forest officers throughout the region. Current infestation consists largely of mixed brood trees containing several species of Dendroctonus and Ips. Very largely the existing infestation is to be found in lightning-scarred and otherwise injured trees. It is encouraging that there have been no aggressive bark-beetle outbreaks in the Southwest for some years, and the indications are that there are no present tendencies toward an increase.

Oregon and Washington 1940 pine beetle survey completed.--On October 30 the current survey to determine forest-insect conditions and activities throughout the ponderosa pine forests of Oregon and Washington was terminated, according to J. M. Whiteside, of the Portland forest-insect laboratory. Twelve temporary assistants employed by the Forest Service and the Bureau completed the survey of 158 permanent 320-acre check plots in virgin stands on October 3. Two temporary employees of the Bureau assisted the Indian Service with the survey of 8 640-acre plots on the Yakima Indian Reservation, Wash. During the last 2 weeks of the month loss data on 18 half-section plots on selectively cut-over lands on the Malheur National Forest, Oreg., were also obtained. In addition to these intensive plot surveys, the entire ponderosa pine region of approximately 11,000,000 acres was covered by extensive or observational reconnaissance during the summer. In general the infestation trend in this region shows an upward trend and estimated losses for 1940 are higher than those of 1939, except in the Blue Mountains of eastern Oregon. As a direct result of these surveys control projects have been recommended and are now in progress or soon will be started on 3 National forests and 2 Indian reservations.

Risk changes may occur rapidly in ponderosa pine.--W. D. Bedard, Portland, reports the case of a ponderosa pine tree which changed from a good to a poor risk during the course of one season. Early in 1940 the tree in question appeared to be a normal, thrifty 2A with a dense crown and an abundant complement of long, coarse needles. In August it was noted that the tree was shedding an abnormal number of needles and by the end of September it had lost all but the 1940 growth on most branches. The tree now has a very thin crown with a very small complement of long needles. The tree was climbed, but no evidence of insect injury could be found. Additional observations are planned during subsequent seasons to determine the eventual outcome of this sudden risk change.

Dendroctonus valens may indicate high-risk trees.--While marking a large number of high-risk trees on a 640-acre check plot to be used in conjunction with the Blv Experimental Salvage Logging Study, F. P. Keen and W. D. Bedard, Portland, noted the prevalence of D. valens Lec. at the base of many of the high-risk trees which were being marked. This condition was particularly noticeable in lightly burned areas where the root collars of the trees had been scorched or burned. In such areas the D. valens attack was almost invariably restricted to high-risk trees, regardless of the intensity of the burn. Some low-risk trees were severely burned, but were unattacked by D. valens, whereas some high-risk trees were but slightly scorched and had been heavily attacked by this insect. Even where no burning had occurred, D. valens was frequently found at the bases of high-risk trees. No conclusions can be drawn on the basis of this preliminary observation, but the indications are that this insect may play an important role in the decline and final death of ponderosa pines.

Mountain mahogany in eastern Oregon heavily defoliated.--An outbreak of an unidentified lepidopterous defoliator of mountain mahogany (Cercocarpus ledifolius) was discovered by W. J. Buckhorn while conducting western pine bark-beetle surveys on the Malheur and Ochoco National Forests of eastern Oregon during the last month. The infestation covered an area approximately 10 miles in width and 80 miles in length. Although defoliation was comparatively light over most of the area, in certain localities every vestige of

foliage had been stripped from these bushes. As this area involves a game refuge where deer depend almost entirely on mountain mahogany and juniper for winter feed, this defoliation of one of their most important browse plants may create a serious forage problem during the coming winter.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth work in remote barrier zone sections.--Several snow squalls occurred during the middle of October in the New England area where gypsy moth work is being conducted, but it remained on the ground only a day or two. Sufficient snow fell in some sections of central and northern Vermont to make driving conditions hazardous, and the high elevations in the Green Mountains were blanketed under several inches of snow. Heavy frosts, wind, rain, and snow contributed to the rapid shedding of deciduous foliage. Because of the shedding of the foliage it was possible to start intensive examinations of growth in the immediate vicinity of points where evidence of gypsy moth infestation had been located earlier in the season, when the foliage was so heavy that a thorough inspection of treetops was impractical. Gypsy moth scouting work in remote and nearly inaccessible areas in the barrier zone is progressing satisfactorily, and it is anticipated that a substantial amount of work will be completed in such areas before severe winter conditions become prevalent. Many of the roads extending back into these unsettled and heavily wooded areas are in passable condition at this time but will be closed to automobile traffic after the first heavy fall of snow, as no attempt is made to keep them plowed out. As much work as possible is done in these remote areas during the latter part of the summer and early in the fall, but it is not always possible to avoid long walks during the winter from the points that can be reached by the trucks to the extensive tracts of woodland where work is needed. However, much potential lost time is avoided by careful planning.

Rain and snow provide opportunities for burning accumulated brush piles.--The fire hazard in the barrier zone was substantially reduced by rain early in October, which permitted the safe burning of large quantities of brush and debris accumulated during gypsy moth treatment work at infested locations in Massachusetts and Connecticut. Although the ground litter was damp, extreme care was exercised, and the fires were kept small and compact. As is the usual practice, all fires were completely extinguished at the end of work each day, to prevent danger to the forests from that source. The snowfall that occurred about the middle of the month provided another opportunity to burn accumulated brush, but the snow quickly disappeared and the burning work was discontinued because of the fire hazard presented by the carpet of newly fallen leaves.

Not enough W. P. A. gypsy moth workers available.--Thus far, it has been impossible to secure and maintain the number of W. P. A. workers needed for gypsy moth work in the 5 States where Federal control and extermination treatment is in progress. Because of the scarcity of industrial plants in Lackawanna and Luzerne Counties, where a large amount of gypsy moth work is done, there has been less difficulty in obtaining workers in Pennsylvania than in most other areas, although the turn-over of personnel is frequently high. At the beginning of October, about 75 percent of the total number of W. P. A. workers requisitioned for assignment to the Pennsylvania project

had been supplied and additions during the month brought the total number of employees up to approximately 550. Their work is supplemented by that of National Youth Administration crews, and also by crews supplied by the Department of Public Assistants. As a result of the lack of available workers in Connecticut, where skilled and unskilled workers are in constant demand for many highly developed industrial centers, only a small proportion of the work planned in that State has been accomplished. It is hoped that additional workers can be obtained in Connecticut when road and other construction projects are completed or discontinued on account of cold weather. Similar difficulties have been experienced in Massachusetts, where approximately 10 percent of the total force resigned in 1 week to accept work in private industry and where replacements are inadequate. While the employment situation is slightly better in New York State and in Vermont, it has not been possible to obtain the number of W. P. A. workers needed in either State. The personnel in Vermont was increased by approximately 20 percent late in October, and the men were urgently needed to fill vacancies and to organize additional crews for scouting work in the townships of Castleton and Hubbardton, Rutland County, where several small and widely scattered gypsy moth infestations have already been found, and for work in other localities in that State. In each State the workers available are employed in locations where work is urgently needed, but the work planned for the current fiscal year cannot be completed unless additional men become available during the winter.

Results of gypsy moth scouting in Vermont.--A small force of agents detailed to the reexamination of various locations found to be infested during the fiscal year 1940 in Ripton, Addison County, Vt., failed to discover any evidence of living gypsy moth infestation, despite the fact that several of the old colonies are located in woodlands consisting of tree growth particularly favored as food by gypsy moth larvae. The examination of large tracts of down and lodged trees resulting from the hurricane of 1938 was completed early in October in Eden Township, Lamoille County and in Lowell Township, Orleans County, and resulted in the discovery of one single-egg-cluster infestation in each town. Progress has been very slow in this section because of the tangled mass of forest wreckage that must be carefully examined. Numerous scattered egg clusters were found and creosoted in Castleton and Hubbardton Townships, in Rutland County, and in Pownal and Bennington Townships, in Bennington County. Most of the infestations in Castleton and Hubbardton, which are being scouted for the first time in several years, consist of a single egg cluster each and are at wide distances from each other. In each case careful examinations of the immediate surroundings were made to determine the extent of the infestations, but additional egg clusters were found in only a few instances. The distribution of these infestations indicates that they were established by the wind dispersion of small gypsy moth larvae, probably during the spring of 1940.

New gypsy moth infestations found in Massachusetts.--Living gypsy moth pupae were found in the townships of North Adams, Great Barrington, and Hancock, in Berkshire County, and in Worthington Township, Hampshire County, late in September. It is very unusual to find gypsy moths in the pupal stage so late in the season. Numerous small infestations were found early in October by crews scouting on Hogback Mountain, one of the foothills

lying to the east of Mount Greylock, in the townships of Adams and North Adams, Berkshire County. Although all egg clusters found were thoroughly creosoted, no attempt was made to conduct intensive scouting or treatment work at that time because of the density of the foliage and the delayed egg deposition. Several scattered infestations were also found on the eastern slopes of Mount Greylock itself, and it is now evident that extensive spraying work next June, in addition to thorough winter treatment work, will be necessary to completely exterminate the insect in this section. Several gypsy moth infestations have also been found in Hancock Township, Berkshire County, where no scouting has been done since 1938. The general character and distribution of these colonies indicate that their origin may be attributed to wind spread. All infestations found so far are of approximately the same size, usually consisting of one old egg cluster and five or six new ones, which leads to the belief that the infestations have been established about 1 year.

Scouting begun in spruce forests.--Scouting of woodland blocks containing a high percentage of spruce growth was recently started in the townships of Becket, Florida, Savoy, and Washington, in Berkshire County, Mass. Because of the fact that several hundred tons of spruce boughs will be cut and baled for shipment to points outside of the quarantined area, gypsy moth scouting crews in these regions are concentrating their efforts on the examination of woodland areas from which the boughs will be taken. In the event that gypsy moth infestation is found in or near spruce growth from which boughs are to be cut, the egg clusters are creosoted and the operator is warned against moving or baling the boughs until they have been carefully examined for further evidence of infestation. Large numbers of Christmas trees are also cut annually in this section and are handled in the same manner as the spruce bough shipments. With the advent of cold weather, operators in Pennsylvania also began to cut large quantities of spruce boughs within the area quarantined by the State on account of the gypsy moth, thus materially increasing the volume of inspection work in that territory.

Large quantities of favored food plants removed by private industry.--Two small industries in Canaan, Conn., provide an outlet for poplar and white birch cut in the nearby towns in northern Litchfield County. One, a small sawmill, produces staves from poplar, which otherwise would find no market in that locality. The other industry consumes large quantities of white birch in the manufacture of wooden novelties. The wholesale cutting of these trees by the property owners will materially aid the gypsy moth work which is being done in that vicinity to control and exterminate the insect. Poplars and birches occur in large numbers in infested wood lots in that area, and afford favorable food for gypsy moth larvae if left undisturbed.

Shaggy-barked white oaks difficult to inspect.--A crew scouting in the township of Southbury, New Haven County, Conn., located a new gypsy moth infestation about $2\frac{1}{2}$ miles distant from a colony found in the same township during the fiscal year 1940. Later intensive work revealed several new egg clusters on shaggy-barked white oaks, which were prevalent throughout the area and which are very difficult to inspect thoroughly. The examination of 1 of these trees from the ground disclosed the presence of 2 egg clusters, and a subsequent close inspection, made by the systematic

and careful removal of loose bark by a crew member who climbed into the tree, revealed 12 more egg clusters that could not be seen until the bark had been removed.

Gypsy moth infestations found in Pennsylvania mountains.--Several gypsy moth infestations have been found in Spring Brook Township, Lackawanna County, Pa., where the country is heavily wooded and mountainous. Although extermination work is difficult in this section on account of the prevalence of ledges and because of the rocky nature of the land, satisfactory progress has been made in reducing the severity of the infestations.

Gypsy moth quarantine affects many shipments in Pennsylvania.--During the period October 1 to 15, 6,883 shipments of various materials and articles were allowed to move on permit in the area of Pennsylvania which is affected by the State gypsy moth quarantine regulations. During the same period, 685 shipments originating in the generally infested area were inspected and certified for shipment. As a result of these inspections, 2 gypsy moth egg clusters were found on cordwood, 4 on surface stone, and 2 on spruce boughs. The shipments were allowed to move after the egg clusters had been thoroughly creosoted and removed, with the exception of the spruce boughs which were burned.

Quarterly report of C. C. C. gypsy moth work.--The report for the quarter from July 1 through September 28 shows that work was done from 3 camps in Massachusetts, 3 in Connecticut, and 2 in Vermont. A total of 20,586 6-hour man-days was used in gypsy moth work on more than 6,000 acres. Over 1,400 acres was rebrushed, and 486 acres thinned. Nearly 20,000 new gypsy moth egg clusters were destroyed in connection with this work, in addition to those killed during the burlapping operations.

C. C. C. gypsy moth work during October.--C. C. C. gypsy moth work during October consisted chiefly of selective thinning and the removal of sprouts of favored food plants in areas previously thinned. Piles of accumulated brush were burned on days when conditions were satisfactory. In accordance with silvicultural principles employed by the C. C. C., the assembling of material for burning was reduced as much as possible, the brush being scattered and the logs left on the ground after being trimmed in areas where the owner did not want the wood and where other conditions were favorable for this method of treatment. A considerable number of large white oaks and old apple trees were removed, and many large oaks and poplars were girdled after the property owners had given permission. Scouting work was begun at several of the camps toward the end of the month, the work being concentrated in areas now accessible but which cannot be reached after a heavy fall of snow. The most advantageous locations for future thinning operations were also selected. Contacts were maintained with local moth superintendents in towns in Massachusetts where C. C. C. work is done in order to coordinate the work of the different agencies, prevent duplication of work, and to promote a better understanding of the results desired and the methods used. Many property owners have also been interviewed and have been taken to see the work in progress, the results obtained, and the need for additional work on their properties. In practically all cases the owners expressed satisfaction with the work and gave permission for the additional work needed.

Time used by C. C. C. on gypsy moth work reduced during October.--The numbers of C. C. C. enrollees available for gypsy moth work under the supervision of this Bureau varied considerably during October, ranging from a low of 984 6-hour man-days during the first week to a high of 1,701, with a total of 6,462 man-days for the period. This total is proportionally less than the total for the previous month, as the September tabulation included 4 weeks, whereas 5 weeks were included in October. The reduction in time was attributable to several causes. There was a low enrollment at the beginning of the new period, and considerable time was used in training the new enrollees in the different phases of gypsy moth work and in the proper use of sharp-edged tools. The latter training is in accordance with C. C. C. safety regulations, which seek to keep time lost because of accidents at a minimum. More time was lost from gypsy moth work because of the training of the new enrollees in fire-fighting technique, to the necessity of holding crews in or near the camps during periods when the danger of forest fires was greatest, and to the actual fighting of forest fires.

PLANT DISEASE CONTROL

Survey work in Missouri, summary.--In recent months, George M. Frandsen, State leader of barberry eradication in Missouri, has made an analysis of the results of control work completed in 31 counties since 1935. The purpose was to determine the type of program that would prove most effective yet economical in certain heavily wooded north-central Missouri counties. A review of the data assembled indicates that of 278 properties on which barberry bushes were found and destroyed, 45 having more than 700 bushes would have been missed had the survey been restricted to farm sites, including the yards, gardens, orchards, and wood lots immediately adjacent to farm buildings. Eighteen properties having 75 bushes would have been missed had the survey included uncultivated territory within a radius of 2 miles beyond properties on which planted barberry bushes were found. In commenting upon the results of work already completed in Missouri, Mr. Frandsen points out that most of the bushes that would have been missed had the survey included only the farm-site and adjacent wooded areas, were found on abandoned farm sites usually considerable distances from passable roads. Eighty-six such abandoned farm sites, some of which had barberry bushes, were encountered by survey crews during the period of 1 month. On the basis of the above, it has been concluded that any survey procedure other than one involving a systematic inspection of all uncultivated land is likely to result in a large proportion of abandoned farm sites being missed.

State W. P. A. project approved for West Virginia.--William M. Watson, State leader of barberry eradication in West Virginia, has received notice that a Bureau-sponsored project in the State W. P. A. program has been approved for operation in the Barberis canadensis area of the southern part of that State. The project provides for the employment of 122 men for a period of 12 months. It is expected that work will begin about January 1. Barberry eradication in West Virginia involves two distinct problems. Although some common barberry (B. vulgaris) is found in the southern part of the State, it is much more prevalent in northern counties where little, if any, B. canadensis has been found to date. According to Mr. Watson, the original survey of B. vulgaris areas in Jefferson County was completed on June 30, 1940, and a survey of Brooke County is now under way. The supervisor in charge of the B. vulgaris work is located at Wellsburg, Brooke

County, and from this point it is planned to work Hancock, Brooke, Ohio, and Marshall Counties.

County governments and other local agencies in Minnesota aid in barberry eradication.--During the last 2 years 12 counties in Minnesota have aided the Bureau in sponsoring barberry eradication projects in the State W. P. A. programs. Aid supplied by the counties, in most cases transportation for workers, is valued at more than \$7,000. According to L. W. Melander, in charge of control work in Minnesota, State project crews are now working in Dakota, Pope, and Swift Counties and it was expected that survey would be resumed in Fillmore County early in November.

California blister rust infections.--W. V. Benedict and C. P. Wessela, during an inspection trip early in May on the Oregon side of the Klamath National Forest, looked over a few pine trees for infection and discovered 1 incipient blister rust canker on a small pine a few miles south of the border. W. W. Wagener, of the Division of Forest Pathology, also reported at this time the discovery of 2 small cankers in the Montgomery Creek area on the Lassen National Forest, where numerous infections on Ribes were located in 1938. On August 10, Mr. Benedict reported that an important development in the sugar pine region was the discovery of 2 infected sugar pines along Bailey Creek near Viola on the Lassen National Forest. The pines were located by H. G. Lachmund in the general vicinity of the Ribes infections found there in 1938. This infection places the southern known limits of pine infection in California approximately 107 miles south of the Oregon border. Judging from negative scouting results insofar as new infections on Ribes are concerned, this year, like last, has been another unfavorable year for long-distance spread of infection from the pine infection centers in the North to Ribes in California. Although scouts have located numerous rust infections on Ribes, all thus far have been identified by the Division of Forest Pathology as pinyon rust. Scouting in the Shasta and Klamath National Forests from late in August through September was directed primarily toward determining the extent to which infection had become established on pines as a result of previous years' spread of the rust to Ribes, especially from the waves of Ribes infection which blanketed the Klamath National Forest and extended more lightly over the Shasta National Forest in 1937 and 1938. Results on the Shasta National Forest were entirely negative, but over the moister regions of the Klamath National Forest a wide-spread return of infection to sugar pines was found. The infected sugar pines were found near Ribes bushes infected in 1937, and some occurred as far south as the latitude of Somes Bar, over 50 miles south of the Oregon border. Infections ranging from a single tree with 2 cankers to over 100 trees with several hundred cankers were discovered at the following places: Poker Flat, Indian Creek Road (3 locations), South Fork of Indian Creek (2 locations), Elk Creek (3 locations), Burney Creek, along the Klamath River at Cottage Grove, Tea Creek and Eyesbar, and on the ridge over Teneyck Creek opposite to Somes Bar. While time did not permit a thorough examination of all drainages in the Klamath National Forest, a sufficiently representative sample of infection conditions over the forest as a whole was obtained, in order to feel reasonably certain that pine infection is now scattered over the area in which sugar pine trees occur on this forest, extending into the Marble Mountains at the southern end of the forest, and probably extending into the northern end of the Trinity Forest.

New blister rust control publication.--Presenting the subject, "Blister Rust Control in the Management of Western White Pine," Kenneth P. Davis, formerly silviculturist of the Northern Rocky Mountain Forest and Range Experiment Station, and Virgil D. Moss, assistant pathologist of this Bureau, have prepared a very timely paper dealing with the ecology of Ribes and western white pine and the effect of timber-management practices on their regeneration and growth. This report is of 34 multilithed pages including 1 full-page map and 6 pages of pictures. It was issued June 1940 as Station Paper No. 3 of the Northern Rocky Mountain Forest and Range Experiment Station.

Blister rust exhibit visited by 80,000 persons.--An exhibit entitled, "White Pine Blister Rust," was displayed at the Pacific International Livestock Exposition at Portland, Oreg., during the period October 5 to 12, 1940. The exhibit is built of knotty white pine and contains a diorama depicting various blister rust control activities in a typical forest setting. Thorough explanations of the various activities accompany the diorama. An excellent specimen of an infected tree trunk is included, plus a good picturization of the summer and fall stages of blister rust on a Ribes leaf. Attendance at the exposition was approximately 130,000 persons. Of this number, about 80,000 visited the blister rust exhibit. Not all the visitors absorbed the message carried by the exhibit, but it is felt that nearly 30,000 persons were given at least an introductory understanding of the blister rust disease. Publications containing blister rust information were offered free to visitors. It is felt that placement of the exhibit at the exposition was a highly successful educational venture. The diorama was displayed again from October 26 to November 1 at the Great Western Livestock Show in Los Angeles, where approximately 6,000 visited the exhibit.

COTTON INSECT INVESTIGATIONS

"Wild Turk's cap" as a host of the pink bollworm.--The first pink bollworm recorded from Malvaviscus drummondii was collected from a green seed capsule of this malvaceous plant at Brownsville, Tex., on September 15, 1939, and reported by L. C. Fife in the Bureau News Letter for September 1939 (v. 6, No. 11, p. 18, Nov. 1, 1939). On October 3 and 4, 1940, about 8,000 blooms and seed capsules of M. drummondii were collected near Matamoros, Mexico, by F. F. Bibby, Ignacio Moreno, Clyde Richmond, and Ivan Shiller and placed in cages for moth emergence. Between October 8 and November 5, 33 moths of Pectinophora gossypiella Saund. emerged from this material, and the emergence may not yet be complete. Also, among the larvae taken from blooms collected and examined on October 4 by I. Moreno, 7 were pink bollworms. Approximately 7,000 additional blooms and seed capsules of wild Turk's cap were collected from the vicinity of Matamoros and approximately 15,000 from the vicinity of Brownsville during the first week of October, and from these no pink bollworm moths have yet emerged. The determinations of most of the moths were made by F. F. Bibby and were later verified by J. F. Gates Clarke, of the Division of Insect Identification, and the larvae were determined or verified by C. Heinrich of that Division. The 40 pink bollworms, collected from or reared from M. drummondii up to November 6, 1940, and the 1 larva collected in September 1939, which have been determined or verified by the Division of Insect Identification, have come from plants growing adjacent to or not far distant from heavily infested cottonfields. This plant is widely distributed in woods and thickets,

along canal and river banks, irrigation ditches, fence rows, and other waste land on which dense vegetation abounds in southern and southeastern Texas and in northeastern Mexico. Because of its beauty, wild Turk's cap is occasionally cultivated for ornamental purposes. Both blooms and seed capsules are produced in abundance during the entire year. It belongs to the family Malvaceae and because of its common name, Turk's cap, should not be confused with Turk's cap lily. Other cotton insects reared from Turk's cap at the Brownsville laboratory during October and determined by C. Heinrich were the bollworm (*Heliothis armigera* (Hbn.)), the cotton square borer (*Strymon melinus* (Hbn.)), and *Crocidosema plebeiana* Zell.

Cage and laboratory tests against bollworm, boll weevil, and cotton leaf worm.--R. W. Moreland, E. E. Ivy, and K. P. Ewing, of the Waco, Tex., laboratory, report on the results of cage and laboratory tests conducted during August and September. The insecticides used were calcium arsenate, lead arsenate, calcium arsenate 92.5 percent plus paris green 7.5 percent, regular and micronized barium fluosilicate, Cape aloes, sodium fluosilicate, micronized sodium fluosilicate, basic copper arsenate, basic copper arsenate 1 part plus hydrated lime 1 part, and four cryolites containing 50.2, 66.1, 87.9, and 94.6 percent sodium fluoaluminate, respectively. With the exception of Cape aloes, all insecticides were applied with rotary hand-dust guns calibrated to apply a given amount per acre. A portion of a row of cotton, on which plants to be used had been selected, was dusted with 1 of the insecticides after bollworms were placed on the plants. Laboratory-reared larvae of the second, third, and fourth instars were used. One bollworm was used to a cage in the beginning but later it was found that as many as 5 to a cage could be used without the worms displaying any cannibalistic nature. Following the dusting, cages were placed over the plants to be used. In the boll weevil and leaf worm tests the plants were dusted early in the morning and the cages placed over them before the insects were released. Ten field-collected adult boll weevils or leaf worm larvae were used per cage. The following table shows the results of these tests.

Insecticide used	Bollworm		Boll weevil		Cotton leaf worm	
	:Mortal-:		:Mortal-:		:Mortality:	
	Worms:ity,120:		Weevils:ity,120:		Worms:120 hours	
	: hours :		: hours :		:	
	Number	Percent	Number	Percent	Number	Percent
Basic copper arsenate and lime (1:1)-----	18	100.0	59	98.3	--	--
Lead arsenate-----	33	87.9	30	86.7	60	96.7
Cryolite (66.1% Na ₃ AlF ₆)-----	29	82.8	--	--	--	--
Basic copper arsenate-----	57	80.7	195	76.4	58	77.6
Cryolite (87.9% Na ₃ AlF ₆)-----	38	78.9	--	--	--	--
Cryolite (50.2% Na ₃ AlF ₆)-----	11	72.7	--	--	--	--
Cryolite (94.6% Na ₃ AlF ₆)-----	21	66.7	--	--	--	--
Calcium arsenate-----	59	66.1	189	70.4	55	85.5
Cal.ars. 92.5%, paris green 7.5%:	17	58.8	--	--	--	--
Barium fluosilicate-----	17	58.8	--	--	--	--
Sodium fluosilicate, micronized--:	8	50.0	--	--	--	--
Sodium fluosilicate-----	8	37.5	--	--	--	--
Cape aloes-----	--	--	--	--	59	0.0
Check-----	42	2.4	114	9.6	59	1.7

The basic copper-arsenate-lime mixture gave the highest kill, with 100 percent mortality of the bollworms and 98.3 percent of the boll weevils in 120 hours. The undiluted basic copper arsenate did not produce a dust cloud comparable to calcium arsenate nor cover the plants thoroughly, but by mixing with equal parts of hydrated lime and doubling the dosage a much better distribution was obtained and the mortality was apparently increased about 20 percent. Undiluted basic copper arsenate and the mixture with lime also killed bollworms and boll weevils quicker than did calcium arsenate. Lead arsenate gave the best results against the leaf worms, while Cape aloes did not kill any of them. In the laboratory tests bollworm larvae were fed for 24 hours on disks of dusted leaves placed over moist sand in jars and were then given untreated cotton squares for food. The mortalities were lower than in the cages, the best results being 73.9 percent kill with cryolite, 65.4 percent with calcium arsenate, and 61.5 percent with basic copper arsenate.

Southern armyworm on cotton in Florida.--C. S. Rude, of Gainesville, Fla., reports that Prodenia eridania (Cram.) appeared in many cottonfields in Lake, Gilchrist, and Marion Counties, Fla., during the latter half of July. The worms appeared to be migrating to the cotton from nearby tomato and weed fields. Pokeweed was among the most favored of the host plants. The cotton leaf worm (Alabama argillacea Hbn.) was also present, but in many cases the defoliation caused by the armyworm was more severe than that produced by the leaf worm. Dusting with calcium arsenate at 12 to 15 pounds per acre gave only mediocre control and poisoned bait was used with various degrees of success but in general was not entirely satisfactory against the armyworm. In one instance where small pigs had the run of the cottonfield they were observed rooting around the plants to a depth of about 2 inches and eating the armyworm pupae. Examination of the soil revealed no pupae where the pigs had worked, whereas in other cases pupae were numerous. No damage resulted to the cotton from the activity of the pigs.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--In the control and eradication of the pink bollworm it is of the utmost importance that we determine each season the status of infestation in areas under regulation on account of this insect and ascertain whether or not any movement has taken place to outside areas. To obtain such information, inspection of gin trash is conducted each season throughout important cotton-producing areas of the United States. Gin-trash inspection was concentrated during October in the Panhandle district of Texas, inside and outside of the quarantined area. Large amounts of trash were run in Tom Green and Concho Counties, in the Panhandle district, where a very light infestation was found last season for the first time. Only one specimen was found in Tom Green County and none in Concho. An extremely light infestation was found in Midland, Martin, and Howard Counties, within the Panhandle, in October, but no new area was involved. Annual inspection in the Arizona district was also begun in October and a light infestation was found in the Glendale area of the Salt River Valley, where infestation was present last season. A few specimens were found in the Safford Valley of Arizona. During the annual inspection in the Pecos Valley of Texas and New Mexico it was found that the infestation in Ward, Reeves, and Pecos Counties, Tex., and in Eddy County, N. Mex., showed a sharp reduction over the past season. For the second consecutive year no pink bollworms were found in Chaves County, N. Mex.

Stalk destruction.--Since the discovery of the pink bollworm in the lower Rio Grande Valley of Texas and Mexico in the 1936 cotton crop, field clean-up has been conducted each season in south Texas and adjacent Mexican areas as one of the principal measures for pink bollworm control. Farmers on both sides of the Rio Grande cooperated practically 100 percent during the present season in carrying out the field clean-up program. With the exception of approximately 4,000 acres of late-maturing cotton, on which extensions were granted in September, and small lots of nonresident property amounting to about 6,000 acres, which required considerable time and work in establishing responsibility, stalk destruction had been completed on the 200,000 acres of 1940 planted cotton in the lower Rio Grande Valley on the first of October, the deadline for stalk destruction in that area. This remaining acreage was gradually reduced throughout the month and at the end of the period the original job of stalk destruction had been completed. The field clean-up program was also carried out satisfactorily in the adjacent areas of Mexico. On the first of October 112,000 of the approximate 150,000 acres of cotton in the Matamoros-Reynosa area had been plowed, and stalks had been cut on the greater part of the remaining acreage. Most of the unplowed acreage consisted of low-lying lands along the river front, which had been flooded by excessive rains. At the close of October, stalks on most of this acreage had been destroyed. The deadline for stalk destruction in the Coastal Bend district of the south Texas area was originally established by the State Department of Agriculture as October 15; however, on account of the late maturity of the crop in that area, it was found necessary to extend this date to October 31. Heavy rains throughout the Coastal Bend district during the latter part of October brought field clean-up activities to a standstill and at the close of the period some 14,700 acres of stalks, out of a total acreage of 219,000, remained standing. Most of this unplowed land was in the section of Nueces County, where the crop was replanted late, the first plantings having been destroyed by hail. Owing to unusual conditions, some 50 or 60 farmers requested further extensions at the end of October and a number were granted; however, it was expected that most of this acreage would be destroyed early in November, should weather conditions permit.

Destruction of sprout and volunteer cotton.--Throughout this subtropical area, after a first plowing followed by rains, cotton will sprout from lateral roots left in the ground on account of an imperfect plowing job, and seedling plants will also appear. Besides this type of cotton, there are a considerable number of random plants on acreage abandoned in 1940 and previous years. All of this cotton must be destroyed before it reaches the fruiting stage, in order to maintain an effective starvation period for the pink bollworm. The destruction of such cotton constitutes the second phase of the field clean-up program and was begun toward the end of October. Continuous contact is being made with farmers in an effort to get them to grub out any scattered plants or to replot their land if necessary; however, in addition to the farmer cooperation, it was necessary during the last week in October to place 23 Government-financed grubbing crews in operation to remove sprouts and random plants.

Wild-cotton eradication.--Since the effort to eradicate the pink bollworm from southern Florida and adjacent keys was begun several years ago, very gratifying results have been obtained. The extermination of the insect in that region is being undertaken through the destruction of wild-cotton

plants, which serve as a host. Arrangements were made to obtain W. P. A. workers to carry on this program for the present season, and operations were begun in the last few days of September.. Requisition was made for a total of 90 W. P. A. workers, and early in October '88 such personnel had been assigned to this project. Almost without exception the same workers assigned to this project last season were again assigned this season, which is a distinct advantage, as the men are already trained in wild-cotton eradication work and have a knowledge of the areas to be worked. In most areas fewer wild-cotton plants are being found during the first clean-up of this season than during the first clean-up of last season, especially in Manatee, Pinellas, and Hillsborough Counties. Reductions are also shown in all sections of the Keys subdistrict, and considerably fewer fruiting plants were found in October this year than in October 1939. It is expected that the first cleaning of the season will be concluded in the areas mentioned above before any appreciable number of wild-cotton plants can mature fruit.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Parasites of lima bean pod borer recovered in the field.--Rodney Cecil, of the Ventura, Calif., laboratory, reports the recovery in the field, for the first time, of two species of imported egg-larval parasites and one native species of larval parasite of Etiella zinckinella Treit. Adults of the egg-larval parasite Phanerotoma planifrons Nees. were first released in 1936. No recoveries of it had been made until the summer of 1940, although additional liberations had been made in 1937, 1938, and 1939, in the vicinity of pods of the tree lupine (Lupinus arboreus Sims) or the common lupine (L. succulentus) which were infested with the lima bean pod borer. No liberations of this parasite were made in 1940, because the rearing stock did not survive the winter of 1939-40 in the laboratory. Under these conditions, the recovery of the parasite during the summer of 1940 from field-collected pods of L. arboreus infested with the lima bean pod borer definitely established the fact that the parasite P. planifrons survived the winter under natural conditions near Ventura. Adults of another imported egg-larval parasite, Chelonus inanitus (L.), were released for the first time in 1939 in the vicinity of pod borer-infested pods of L. arboreus and L. succulentus in three counties near Ventura. During late summer of 1940 C. inanitus was reared and recovered for the first time from pod borer-infested pods of L. arboreus. This recovery does not necessarily mean that C. inanitus successfully survived the winter of 1939-40 under natural conditions, as one additional release of the adult parasite was made in July 1940. Releases of the imported larval parasite Microbracon piger Wesm. were made in 1936, 1937, and 1938. Adults of this parasite have been reared and recovered from pod borer-infested pods of wild lupines in 1938, 1939, and 1940. This larval parasite has apparently become well established on the lima bean pod borer on L. arboreus. During September 1940 a native braconid parasite, Angitia sp. (det. by R. A. Cushman), was reared and recovered for what may be the first time from larvae of the lima bean pod borer taken from soil siftings obtained from under wild host plants. In some collections as high as 16 percent parasitization by Angitia sp. was recorded.

Yield of lima beans following first winter's growth of cover crops.--M. W. Stone, Ventura, has reported the first-year results from an experiment conducted on small plots, designed to determine whether differences in the yield of lima beans from injury by the wireworm Limonius californicus Mann.

are influenced by the winter cover crop. The hypothesis being investigated is that the growing of winter cover crops over a period of several winters may increase the wireworm infestation and its subsequent damage to the beans, one of the theories being that the adult beetles emerging in the early spring may oviposit more freely where dense green vegetation is present, thus eventually causing an increase in wireworm infestation and damage to lima beans grown after each successive cover crop. The winter cover crops included in the experiment are barley, mustard, sweetclover, vetch, fenugreek, and one series of plots with no cover crop. The following tabulation shows for three of these winter cover crops and the bare fallow plots (1) the average number of L. californicus larvae per square foot of soil to a depth of 16 inches, found soon after the cover crops had been turned under in the spring of 1940, and (2) the average yield of dry lima bean seed per 0.01 acre harvested in the fall of 1940. The data show that the differences in neither wireworm infestation nor the yield of beans was significant following the first winter's growth of these cover crops.

Winter cover ^{1/}	: Average wireworms:	: Average yield of
	: per square foot :	: dry lima beans
	: of soil 16 :	: per 0.01 acre
	: inches deep :	
	: Number :	: Pounds
Barley-----	1.10	10.9
Mustard-----	1.26	11.7
Clover-----	1.09	12.5
Bare fallow-----	1.05	12.2
Difference required :	:	:
for significance :	:	:
p = 0.05-----	.43	2.8

^{1/} The results from vetch and fenugreek are not included because there were but 12 replicates of each of these treatments.

These tests were conducted in a randomized-block arrangement of plots in 3 fields, there being 16 replicates of each treatment. Most of the plots were 0.12 acre in size while the others averaged 0.17 acre. The winter cover crops were seeded from November 1 to 6, 1939, and were plowed under from late in February to early in April 1940. The infestation in all plots was determined after the cover crops had been plowed under and before the beans had been planted by means of a hand-operated soil sifter. Twenty 1/4-square foot samples of soil 16 inches deep were taken at random from each plot. None of the soil samples were taken within 9 feet of the edge of any plot. The yield of lima beans was determined by harvesting all beans from 0.01 acre located in the center of each plot.

Beet leafhopper populations on pure and mixed stands of Russian-thistle.— From quantitative samples taken at intervals during the summer and early in the fall of 1940, D. E. Fox, of the Twin Falls, Idaho, laboratory, reports that lower populations of Eutettix tenellus (Bak.) were found on mixed stands of Russian-thistle (Salsola pestifer) and downy chess (Bromus tectorum) than

on pure stands of Russian-thistle. On June 21, July 18, August 22, and September 21 the average number of adults and nymphs of the beet leafhopper per square foot of host-plant area were 0.9, 11.8, 14.4, and 8.2 on the mixed stands of Russian-thistle and downy chess, and 3.1, 23.2, 25.9, and 14.1 on pure stands of Russian-thistle. During this period the highest populations of the beet leafhopper were found on the medium-dense, pure stands of thistle, followed in descending order by those on the medium and sparse pure stands. On August 1 and thereafter all stand densities of pure Russian-thistle had approximately the same populations. The leafhopper populations on the mixture of Russian-thistle and downy chess were approximately equal to those on the sparse stands of pure Russian-thistle up to July 11, after which there was an increase in favor of the sparse pure stands. Measurements of the height, condition, and percentage of plant coverage revealed that by July 18, Russian-thistle was the most vigorous on the sparse and medium pure stands and least vigorous on the mixtures of this plant with downy chess. The greatest percentage of cover at the beginning of the season was found on the medium-dense pure stands. By August 14 the sparse pure stands gave the greatest percentage of cover. Sampling to determine the leafhopper populations was done at intervals of 1 week throughout the period June 13 to September 21 on 3 replicated plots of each stand density of pure Russian-thistle and on 9 replicated plots of the mixture of Russian-thistle and downy chess. A $\frac{1}{2}$ -square-foot sampling fork was used in determining the populations of beet leafhopper, 15 fork samples being taken in each plot from June 13 to July 18, inclusive, and 10 from each plot from July 25 to September 21.

Effectiveness of cryolite and cube sprays against tobacco flea beetle.--
In one series of toxicity tests conducted on small replicated field plots of tobacco grown for flue-curing, Norman Allen, of the Florence, S. C., laboratory found that a spray mixture consisting of 6 pounds of cryolite containing 86 percent of the sodium fluoaluminate (Na_3AlF_6) and 2 pounds of cube root powder containing 4 percent of rotenone to 50 gallons of water was more effective against Ebitrix parvula (F.) than was a spray mixture consisting of 2 pounds of cube, containing 4 percent of rotenone, to 50 gallons of water. A third spray mixture included in the test consisted of 2 pounds of lead arsenate and 2 pounds of cube, containing 4 percent of rotenone, to 50 gallons of water. The effectiveness of the treatments was determined by counting the numbers of living beetles before and the number of living and dead at intervals after application on 20 tobacco plants per plot. The average reduction in numbers of living beetles 5 days after application was 80 percent for the spray mixture consisting of cryolite and cube, but only 49 percent for the cube spray. The reduction for the lead arsenate and cube spray for the same period was 75 percent. An analysis of variance of the data showed that a difference of 17 percent between treatments was necessary for a significant difference having a probability of 0.05 (chances of 19-1). The percentages of beetle mortality for the 3 treatments 5 days after application ranged from 79 to 84, there being no significant difference. This indicates that, while the treatments used were about equally effective in killing the beetles, the infestation did not increase after treatment on tobacco treated with spray mixtures containing cryolite and lead arsenate as quickly as they did on the tobacco sprayed with the cube mixture only. Each of the 3 treatments was applied to 3 plots of tobacco containing about 1/12 acre each. Application was by means of a mule-drawn traction sprayer, equipped with a vertical spray boom in such a way that both sides of the

tobacco plants of every row were sprayed with 3 nozzles. Although the application rates were recorded as ranging from 85 to 108 gallons per acre, including the spillage, the actual application rate of each treatment was about 75 to 80 gallons per acre.

Increasing effectiveness of poisoned bran bait against sweetpotato weevil.--From replicated cage tests conducted at the Sunset, La., laboratory, during June and July, K. L. Cockerham and associates report that greater mortality of adults of Cylas formicarius (L.) resulted from a bait mixture of wheat bran and paris green (20 pounds: 1 pound) moistened with extracted juice of sweetpotato, than from a similar mixture moistened with water. The mortality of test insects after 5 days was 85 percent for those confined with the bait moistened with sweetpotato juice, while for the bait moistened with water the mortality was only 48 percent. A mortality of 85 percent resulted among weevils confined with a bait mixture consisting of sweetpotato pulp and paris green (20 pounds: 1 pound) moistened with water, and it was 95 percent for those confined with a bait mixture made of grated sweetpotatoes and paris green (20 pounds: 1 pound). Similar mortalities among weevils confined with wheat bran moistened with the sweetpotato juice and with wheat bran moistened with water were 18 and 30 percent, respectively. Analysis of the data showed that a difference of 17 percent in weevil mortality between treatments was required for significance having a probability of 0.05 (chances of 19-1). These experiments were conducted in cages 9 inches in diameter and 7 inches tall in an outdoor insectary, placed over trays containing sand, in order that both the bait mixtures and the test insects would be exposed to all natural changes in temperature and humidity. In each cage 10 adult weevils were used and there were 4 replications of each test. Mortality counts of the test insects were made each day for 5 days after treatment.

INSECTS AFFECTING MAN AND ANIMALS

Screwworm-control program in Texas.--Results of surveys and research on the biology, habits, distribution, and abundance of the screwworm fly in Texas during the last 5 years indicate that a high degree of control of the pest can be obtained if certain ranch practices are followed during the year, especially during the winter in the southern part of Texas, where it overwinters. On the basis of the research observations, a plan was formulated by which an experimental control program could be undertaken by the Bureau of Entomology and Plant Quarantine, in cooperation with the Extension Service, Experiment Station, livestock associations, and other agencies interested in the screwworm problem of Texas. On October 16, the plan was presented in conference to the representatives of the above agencies at College Station, Tex. The Bureau of Entomology and Plant Quarantine was represented at the conference by P. N. Annand, assistant chief of Bureau; F. C. Bishopp, chief of the Division of Insects affecting Man and Animals, who presided as chairman; and E. C. Cushing, D. C. Parman, and W. L. Barrett, who presented the proposed program. All representatives of the State organizations enthusiastically endorsed the program and offered their full support in putting it into effect. Following the above conference, information regarding the program was presented to the district meeting of county agents of the Texas Extension Service districts at Corpus Christi on October 25 by E. C. Cushing and W. L. Barrett.

Toxicity of pyrethrum emulsion varies with volume of water.--In his report for October, E. F. Knipling states that preliminary laboratory tests show that the volume of water has some influence on the toxicity of pyrethrum emulsion. The volume of water was varied in battery jars in which the surface area was the same. One-half, $1\frac{1}{2}$, and 3 liters of water, respectively, were placed in each jar, representing depths of 1, 3, and 6 inches. Pyrethrum emulsion, applied in 1-to-10 dilution at the rate of 25 gallons per acre, showed the following percentages of mortality of Culex tarsalis Coq. in a typical test: 1 inch, 100 percent; 3 inches, 92 percent; and 6 inches, 72 percent.

Stomoxys breeding along Mississippi Sound.--During the week beginning October 13, a survey was made by S. W. Simmons, of the Panama City, Fla., laboratory, of the region from New Orleans, La., to Pensacola, Fla., for dog fly breeding. The Mississippi Sound, which forms the coast line of most of this area, was not indicated to be of importance in Stomoxys breeding, as its shores were devoid of bay grass deposits, and none was found growing on the floor of the sound. The bays opening into the sound produce a broad-leaf bay grass which, when deposited on the shore in sufficient quantities and at a proper height, serves as a media for prolific Stomoxys breeding. The two major factors limiting the dog fly infestation in this region are (1) comparatively few bays and inlets for grass production, and (2) almost complete absence of beaches for grass depositions. Dr. Simmons found that the shore line of these bays is grown up with rushes which, in many places, extend out into the water and prevent tidal depositions of bay grass from piling up and affording breeding places.

Efficiency of dikes with pump-gate units in control of sand flies.--J. B. Hull and S. E. Shields, of the Fort Pierce, Fla., laboratory, have submitted a comprehensive account with a statistical analysis of figures on the efficiency of dikes with pump-gate units for sandfly control. A total of 13,603 sand fly larvae were isolated from 343 soil samples collected from undiked mangrove marshes, an average of 39.66 larvae per sample. A total of 7,492 larvae were isolated from 341 soil samples collected from undiked pickleweed marshes, an average of 21.97 larvae per sample. A total of 1,051 larvae were isolated from 325 samples collected from diked mangrove marshes, an average of 3.23 larvae per sample. A total of 1,043 larvae were isolated from 341 samples from the diked pickleweed marshes, an average of 3.06 larvae per sample. From all samples from undiked marshes, 21,095 larvae were isolated, an average of 30.84 larvae per sample, and from all samples from diked marshes, 2,094 larvae, an average of 3.12 larvae per sample. If we consider the number of larvae isolated from undiked marshes as 100-percent infestation, then the infestation in the diked marshes was only 10.12 percent, and sand fly breeding has been reduced 89.88 percent. The ratio between samples collected between undiked and diked marshes was found to be 78.83, which is highly significant. An analysis of all data clearly showed that the number of larvae isolated from undiked marshes was significantly greater than the number of larvae isolated from locations of similar distances from drainage ditches in the diked marshes.

FOREIGN PLANT QUARANTINES

Disease of Citrus medica.--A fungus resembling Sphaeropsis malorum Pk. and S. tumefaciens Hedges, but with thin membranous pycnidia not Sphaeropsis-like, was intercepted on October 7 at New York on a Citrus medica fruit in cargo from Palestine. The mycologists have no previous record of such a fungus on Citrus from Palestine. The material obtained was inadequate for satisfactory study.

"Gall" disease of fir.--Small galls found at New York on December 14, 1939, among the needles of Abies balsamea from Newfoundland, in a cargo shipment of 3,048 trees, have been determined as sclerotia of Sclerotinia kernerii Wettstein, not reported heretofore as apparently occurring in North America. It seems possible that sclerotia of the fungus have been seen previously by pathologists and assumed to be insect or mite galls.

Fly-speck fungus on orchids.--An attempt is being made to determine the identity of a fly-speck fungus which has been noted on orchids from South America. Apparently the fungus is a species of Scolecopeltidium, or Scolecopeltium according to some authors. Although of little economic importance, the identity of the fungus is of some scientific interest and material in condition to study will be collected when practicable until its identity is established or until it can be described, if it is a new species.

Entomological interceptions of interest.--Eight living larvae of the trypetid Anastrepha mombinpraeoptans Sein were intercepted at New York on October 17 in golden apple in baggage from Puerto Rico. An adult of the lycanid Everes comyntas herri (Grinnell) was taken at El Paso, Tex., on September 9 in string bean in baggage from Mexico. A living adult of the scarabaeid Cyclocephala signata Drury was found at Brownsville, Tex., on October 3 in the cabin of an airplane from Trinidad. Living larvae of the phalaenid Sesamia cretica Led., were taken at Philadelphia on September 24 in corn husks in stores from Spain. A living adult of the chrysomelid Disonycha xanthomelaena (Dalm.) was intercepted at St. Albans, Vt., on September 24 with clover and grass hay in mail from Canada. A living curculionid adult, Diaprepes famelicus Oliv. var., was found at New York on October 4 in the cabin of the Yankee Clipper arriving from Lisbon, Portugal, and Horta, Azores, and Darrell's Island, Bermuda. A living adult of the chrysomelid Oedionychis durangoensis Jac. was taken on an ear of green corn in baggage at Nogales, Ariz., on September 30 from Mexico. Four living adults and 5 living larvae of the platypodid Platypus australis Chapuis were intercepted at Norfolk, Va., on September 13 in walnut log in cargo from Australia. One living larva of the tortricid Platynota rostrana (Wlk.) was found at New York on September 24 in plantain fruit in cargo from Cuba. Living adelgids Chermes nusslini (Borner) were intercepted at Blaine, Wash., on July 26 on fir in baggage from Canada. This same insect was taken at Seattle, Wash., on June 28 in spruce tips in baggage from Alaska.

Pathological interceptions of interest.--Aecidium sp. was found on August 17 at Nogales, on purslane leaves in baggage from Mexico. Ceratophorum sp. was intercepted on leaves of Erythroxylon coca in cargo from Peru in April, May, June, and August at New York. The fungus we have tentatively called

Ceratostomella fimbriata (S.&H.) Elliott was again found on October 25 at New Orleans, causing a rot of carrots from England. Cercospora musae Zimm. was found on October 14 and 21 at Galveston on banana leaves from Haiti and on October 14 at New York on the same host from Puerto Rico. Ditylenchus dipsaci (Kuhn) Fil. was found on October 5 at New York in a shipment of Japanese narcissus bulbs. Elsinoe australis Bit. & Jenk. was found on October 2 at Galveston on oranges from Argentina. Gloeosporium orchidearum Karst. & Har. was intercepted on October 4 at New York on an unnamed orchid from Venezuela. Melampsora medusae Thuem. was intercepted on October 31 at El Paso on cottonwood leaves from Mexico. Melanconium betulinum K. & S. was found on October 8 at New York on birchwood crates from England. Mycosphaerella citrullina (Smith) Gross. was intercepted at New York on October 16 on Cucumis anguria in mail from Haiti. Pleosphaerulina briosiana Pollacci and Pyrenochaeta penicillata Fckl. were found on August 27 at New York on alfalfa from Kenya Colony, Africa. Rosellinia sp. was found on October 29 at Nogales on wild grass in cargo from Mexico. Sphacelotheca sorghicola (Speg.) Zundel was found on September 5 at New York in broomcorn grain from Argentina. Vermicularia dematium (Pers.) Fr. was found on October 11 at Galveston on okra pods from Puerto Rico.

DOMESTIC PLANT QUARANTINES

Late baiting for grasshoppers.--Control activities by farmers increased materially in October in the Texas and Oklahoma Panhandles, particularly in the latter half of the month following the flights of Melanoplus mexicanus Sauss. from southwestern Kansas. Farmers reported good kills where bait was applied, but considerable damage occurred as infested fields were abandoned where no baiting was done. Field margins of winter wheat were completely destroyed in considerable areas in the southern part of the infestation.

October flights of grasshoppers.--The area most heavily infested with second-generation M. mexicanus in mid-October included the eastern tier of counties in Colorado, the western half of Kansas, and parts of the Oklahoma and Texas Panhandles. In the northern half of the area flights were generally of minor importance and local in nature, but in the southern half, several heavy flights from southwestern Kansas extended the infested area approximately 100 miles into Texas. Early in October heavy flights were reported from six counties of southwestern Kansas.

Season's inspection for phony peach discontinued.--All phases of inspection work for the phony peach disease were discontinued in October. Even in Alabama and Georgia defoliation of trees made it impossible to complete the work outlined. All activities are now directed toward the removal of trees found affected with phony and mosaic diseases during the last inspection season and in removing abandoned and escaped peach trees.

Texas peach-mosaic quarantine revised.--The State of Texas revised its peach-mosaic quarantine, effective October 15, 1940, removing, as prohibited products, all restrictions on plums except those of the Maynard variety.

Chinch bug survey under way.--At the request of several of the States in which chinch bug outbreaks were serious in the last growing season, a cooperative survey of the more heavily infested areas is being conducted in

Kansas, Indiana, Iowa, Missouri, Nebraska, Oklahoma, and South Dakota, for the purpose of estimating probable control needs next year. Following a Federal-State conference held at Des Moines on November 2, surveys were begun in the more northern area. By the time the work in this area is completed the chinch bugs will be in hibernation in the more southern States, it is believed, and the survey will be extended into Kansas, Oklahoma, and southern Missouri. Pest-control officials of Illinois and Ohio report that preliminary surveys indicate that chinch bug infestation is not serious in these States. In South Dakota, although the situation was not serious last season, preliminary surveys by the State inspectors indicate the possibility of a heavy infestation next year and Federal assistance was therefore requested in a survey of 4 or 5 counties in the southeastern corner of the State. H. T. Rainwater is directing the field work, with headquarters at Room 1208 New Post Office Building, Chicago. Philip Luginbill is assisting. Eleven Federal inspectors have been assigned to the work.

Mole cricket baiting.--Assistance in the control of mole crickets in the truck-crop infested areas of Florida was continued during October in Hardee, Hillsborough, Lake, Manatee, Pinellas, Polk, and Volusia Counties. On November 2 authority was given to extend operations, under agreements, to five additional counties, the total area involving approximately 40,000 acres of truck crops. Four mixing stations are in operation. There have been purchased and made available 1,200 tons of bran and 170,000 pounds of calcium arsenate. The bait formula, originally consisting of $7\frac{1}{2}$ pounds of calcium arsenate to 100 pounds of mill-run bran, with sufficient water for mixing, was recently changed to 10 pounds of calcium arsenate to 100 pounds of bran, on the recommendation of the Florida State Plant Board and the Division of Truck Crop and Garden Insect Investigations of this Bureau. H. O. Schroeder is in field charge of the control work, with headquarters at Plant City, Fla., replacing H. T. Rainwater, now in field charge of the chinch bug survey.

Results of inspection for white-fringed beetle.--White-fringed beetles were found this year on a total of 13,649 acres not previously known to be infested. The total known infested acreage on September 30 was 87,898 acres. Most of the new findings were adjoining or near the old infestations, the more important new areas being near Pensacola, Fla., Mobile, Ala., and Long Beach, Miss. The inspections were confined largely to the peripheries of known infestations and to railroad lines and highways leading out of the infested areas. Special attention was given to the eradication areas.

No sweetpotato weevils found in northern Louisiana.--Cooperative sweetpotato weevil inspection, which has been conducted in that part of Louisiana lying north of the area where infestations were known to be generally distributed, has been completed with the result that no infestation of the weevil was found in the northern area. Work was conducted in 28 parishes lying north of and including East Feliciana, West Feliciana, Concordia, Catahoula, La Salle, Grant, Natchitoches, and Sabine. The inspection, conducted at the request of the Louisiana State entomologist, consisted of checking planting stock in the field, as well as the seedbeds, and in some instances wild host plants also. The work was begun on August 22 and completed on October 18.

Hendrickson sees transit inspection demonstrated.--Roy F. Hendrickson, director of personnel of the Department, observed transit inspection in operation at Chicago on October 31, and signified considerable interest in the mechanics of the examination of shipments at the terminal.

Transit inspection at the various stations.--The month's work in New York City resulted in 104 interceptions, the irregularities involving 1 or more of 3 different quarantines in shipments consigned to 30 States, the District of Columbia, and Hawaii. Through the assignment of an inspector from the Japanese beetle force, a "straight freight" inspection tour was arranged at New York, making possible the checking of heavy movement of cotton from the pink bollworm area, scrap metal from the white-fringed beetle area, and forest and quarry products from the gypsy moth area. The Boston inspectors report that, although the October shipments showed an increase of 17 percent over October 1939, in the volume of restricted material examined, there is better quarantine observance on the part of commercial shippers of nursery stock, cable reels, and lumber. Seventy-five percent of the violations found at Boston in October were inspected in transit for the presence of pests, were certified, and allowed to proceed. At Memphis a set-up for the checking of nursery stock shipments arriving by truck from Texas nurseries over the southwestern transportation lines has been put into effect. The Dallas station was reopened on October 21. During the remainder of the month 679 shipments of cotton samples were observed in the mails at that station, while express and freight consignments yielded large quantities of commodities requiring inspection.

Soil samples intercepted.--For the last 2 years transit inspectors have intercepted and returned shipments of soil samples consigned by individuals from the Japanese beetle area to an establishment in Ohio that advertised free analysis of the soil. This fall, however, only a few such shipments have been found, the Ohio firm having arranged for the analysis at a point within the regulated area.

CONTROL INVESTIGATIONS

Insect resistance to insecticides experimentally altered.--The role played by the hemocytes and nephrocytes of the American cockroach (Periplaneta americana L.) in the maintenance of the insect's resistance to poisoning by sodium arsenite and nicotine was investigated by J. Franklin Yeager, E. R. McGovran, Sam C. Munson, and E. L. Mayer, at the Beltsville, Md., laboratory. The methods used involved loading the hemocytes with injected Chinese ink (carbon) particles, or loading the nephrocytes with injected trypan blue, and determining by insecticidal tests, in which contact applications of the insecticide were made, whether or not the attempted blockage had altered the resistance of the injected roaches (nymphs) to the poisons. The results indicate that a functional blockage of the hemocytes but not of the nephrocytes was obtained, that blockage of the hemocytes with Chinese ink caused a decrease in the resistance of the injected roaches to sodium arsenite and, to a slight extent, to nicotine, and that loading the nephrocytes with trypan blue had no effect on the resistance of the roaches to either poison, insofar as indicated by the insecticidal tests. An explanation of these results can be made, partly at least, on the assumption that the hemocytes function as part of an internal defense mechanism and

that, when they become loaded with phagocytized particles, their functions are interfered with. The negative results relative to the nephrocytes do not show that the nephrocytes fail to act as part of an internal mechanism, but only that they failed to influence the resistance of the roaches under these particular experimental conditions.

INSECTICIDE INVESTIGATIONS

Relationship between constitution of halogenated phenols and toxicity.--Studies concerning the effect on toxicity (to goldfish) of the introduction of halogens into the phenol molecule were reported recently by W. A. Gersdorff and L. E. Smith in the American Journal of Pharmacy (v. 112; No. 4, pp. 197-204; No. 8, pp. 316-322; and another article, in press). Monosubstitution of chlorine, bromine, and iodine in each of the three positions was considered. Toxicity is affected with respect to both concentration and survival time. According to the minimal product of concentration and survival time (which measures toxicity in the range of most powerful action), the relative toxicity of the nine compounds at 27° C. to 3 gm. goldfish, as compared with that of phenol, is as follows: o-chlorophenol, 1.15; o-bromophenol, 1.25; m-chlorophenol and m-bromophenol, 1.53; m-iodophenol, 1.61; p-chlorophenol and p-bromophenol, 1.87; o-iodophenol, 2.01; and p-iodophenol, 7.78. Owing essentially to a shift in the concentration factor alone, the most pronounced differences between the iodophenols and the chlorophenols and bromophenols are: (1) Each iodophenol is more toxic than the corresponding compound containing chlorine or bromine. (2) The ortho and meta compounds have changed places, however, in the order of toxicity so that the latter is the least toxic of the iodophenols. (3) The para compound has a pronouncedly greater toxicity than its least toxic isomer, it being five times as toxic in the case of the iodophenols, as compared with one and one-half times for the chlorophenols and the bromophenols.

Preparation of new insecticide, trichloromethanesulfonyl chloride.--A recent chemical abstract refers to a Russian article giving a method for the preparation of trichloromethanesulfonyl chloride and describing its use for the control of the sugar beet weevil. Following a request for this compound from one of the Bureau entomologists, attempts to obtain the original article failed. A procedure was then developed by M. S. Schechter and H. L. Haller in which the yield of the compound is about five times that obtained by the methods described in available literature. The compound is a lachrymator, a fact which may limit its use as an insecticide.

Testing growing plants for nicotine.--The November 1940 issue of the Journal of Official Agricultural Chemists contains an article by L. N. Markwood on a method for testing living tobacco plants for their nicotine content. By use of this method tobacco breeders can select desirable plants, such as high-nicotine or low-nicotine individuals, directly in the field, without having to harvest the entire crop for later analysis. A small portion of leaf, such as a disk of about 20 mm. diameter, is disintegrated with strong sulfuric acid and the diluted extract so obtained is purified by treatment with lead oxide. In this way all the interfering substances occurring in the tobacco are removed and the small quantity of lead dissolved by the treatment is also removed, with elemental magnesium. A final solution is thus obtained, which contains all the nicotine originally present in

the sample. This small quantity of nicotine can be determined best by methods especially developed for estimating very small quantities of nicotine. In the same issue of the above journal Mr. Markwood discusses two such methods, one being a turbidimetric measurement of the suspension resulting from the interaction of nicotine and phosphotungstic acid, while the other is a colorimetric procedure depending upon measurement of the red color produced by nicotine and beta-naphthylamine. A valuable by-product of the research on determining nicotine in the living plant was the discovery that a certain type of tobacco, Maryland broadleaf, contains a notable quantity of nornicotine. In fact, about 95 percent of the total alkaloid consists of nornicotine, while the remainder is nicotine. This order reverses the usual relationship and is of special significance as nornicotine has insecticidal toxicity equal to, and even exceeding, that of nicotine, while at the same time its toxicity to animals is much less. As the names indicate, there is a very close relation between the two alkaloids, nicotine being the methyl derivative of nornicotine.

BEE CULTURE

Bacillus larvae in intestinal tract of honeybee larvae.--E. C. Holst, Laramie, Wyo., reports: "In the October 1, 1940, issue of the News Letter (v. VII, No. 10, pp. 25-26) A. W. Woodrow, of the Intermountain States Bee Culture Field Laboratory, reported successful production of American foulbrood in honeybee larvae by individual inoculations with spores of Bacillus larvae White, provided the larvae were inoculated less than 2 days after hatching from the egg. Microscopic examinations of stained smears from inoculated larvae revealed that spores ingested by such larvae germinate promptly and produce chains of from 30 to 40 cells in 24 hours. Multiplication of B. larvae continues within the digestive tract of the larva until large numbers of rods can be demonstrated. These rods persist in the intestinal tract throughout the subsequent larval development until the insect dies, generally after sealing and cocoon spinning, either in the larval or pupal stage."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A new lepidopterous record for the United States.--In material submitted for determination by Leith F. Hitchcock, of the Commonwealth of Australia Prickly Pear Board, at Uvalde, Tex., J. F. Gates Clarke reports a series of 17 specimens of Cremastobombycia lantarella Busck (family Gelechiidae). This is the first record of this species from the United States. It was described from the Hawaiian Islands (Proc. Ent. Soc. Wash. 12: 133, 1910), where it had been introduced from Mexico.

The third North American record of a rare, parasitic ant.--W. W. Fassig, of the Delaware Agricultural Experiment Station, recently submitted for identification 31 winged queens of an ant which he had found at Newark, Del., on August 24, 1940, in a nest of the pavement ant (Tetramorium caespitum (L.)). These specimens appear to be Anergates atratulus (Schenck), a well-known, but comparatively rare, degenerate European ant, which is parasitic on T. caespitum. The males and queens of A. atratulus, which are the only castes represented in this species, are unable to care for and feed themselves and, therefore, live entirely at the expense of the host species.

Before taking their nuptial flight from the T. caespitum nest, the A. atratulus queens mate with their wingless, pupoidlike brothers, after which they seek adoption in some new colony of the host ant. The workers of a successfully invaded T. caespitum colony accept the A. atratulus queen, destroy all their own males and queens, as well as immature specimens, and aid the queen of the parasitic species by rearing her future brood. No specimen of Anergates had been found in North America until 1934, when W. S. Creighton recorded a single winged queen from Edgewood, N. J. Creighton considered the specimen to represent a new species and described it as A. friedlandi. On July 4, 1936, J. C. Bridwell took another winged queen at Kearny Station, Arlington County, Va. This he believed to be atratus. Neither Creighton's specimen nor Bridwell's was taken from the nest of its host species. A number of the queens collected by Fassig and the single specimen collected by Bridwell are on deposit in the National Museum. From available evidence it appears that A. atratulus and its host species represent introductions into the United States.

A European mirid recorded from the United States.--C. F. Doucette, of the Bureau's laboratory at Sumner, Wash., submitted for determination several specimens of a mirid stated to be infesting the lower side of Digitalis foliage, spoiling the appearance of the plant by causing spotting and yellowing. The species was determined by H. G. Barber as Dicyphus pallidicornis (Fieber), a European species recorded as feeding on Digitalis purpurea in England. Apparently this is the first record of its occurrence in the United States.

A new distribution record for a pest of apple.--Among material submitted for determination by C. F. Doucette, Sumner, Wash., was a large series of Anthophila pariana (Clerck) (Glyphipterygidae). This species was formerly placed in the genus Hemerothila. The first record of its occurrence in North America was published by E. P. Felt (Journ. Econ. Ent., v. 10, p. 502, 1917), under the title, "Apple and Thorn Skeletonizer." In that paper the insect was listed from several localities in New York State. In the National Museum there are specimens from Connecticut, Rhode Island, New Jersey, and New York, but those received from Mr. Doucette, in Washington, represent the first known record of the occurrence of A. pariana in western United States.

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